

center of the cloud having a dull reddish glow. This same witness also describes the lightning as being of the sheet type and of a diffused glare. There is general agreement as to the tremendous hissing, roaring noise accompanying the passage of the tornado. The rainfall attending the storm was light.

As a result of the storm 3 people were killed and 32 injured. Ninety houses were totally or partly wrecked, and the property damage is estimated as between \$250,000 and \$300,000.

551.515 (771)

### TORNADOES OF MARCH 11, 1917, IN MONTGOMERY COUNTY OHIO.

By R. FRANK YOUNG, Meteorologist.

[Dated: Weather Bureau Office, Dayton, Ohio.]

[It is interesting to note that the two tornadoes here reported came on the same afternoon and but little earlier than the storm reported at Cincinnati which is  $0^{\circ} 15'$  west and  $0^{\circ} 40'$  south of Dayton.—C. A., jr.]

Two tornadoes passed over western Montgomery County, Ohio, March 11, 1917, about one hour later in the afternoon than the storm that partly destroyed New Castle, Ind. They moved along parallel paths about 4 miles apart, one just south of the towns of Brookville and Trotwood, and the other about the same distance south of Johnsville and New Lebanon. They occurred about 4:30 p. m. and 5 p. m. (local standard time?) respectively.

*First storm.*—The first of these (I in fig. 1) was apparently a storm of scarcely less violence than the one that visited New Castle, and caused less destruction only because its path lay across a rural community instead of a city.

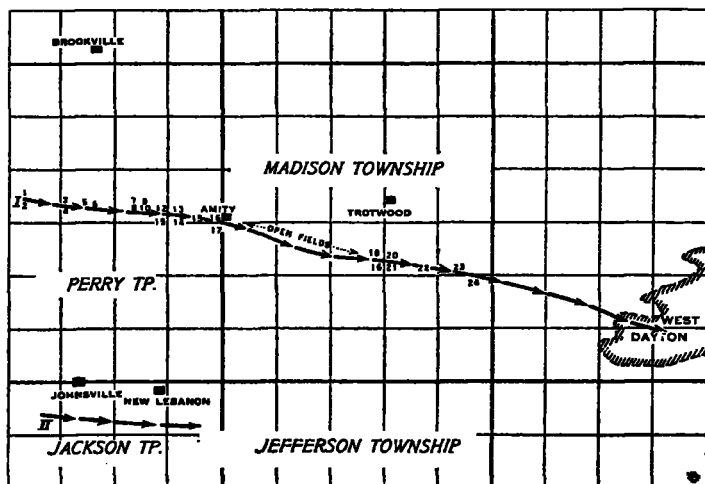


FIG. 1.—Plat of tracks of tornadoes in Montgomery County, Ohio, March 11, 1917.

The track covers a distance of about 9 miles, beginning about the center of section 16 in Perry Township and running a little south of east to the southwest corner of section 23 in Madison Township. Along this line to a width of 150 to 200 yards every farm building, except some of the more substantially built dwellings, was completely destroyed and the debris scattered over the adjacent fields. In some cases debris was caught up in the vortex of the whirl and carried miles along the path.

The storm was of the true tornado type. Of this there is abundant evidence in every part of its track, in the distribution of the debris as well as in its destructive character. The funnel-shaped cloud was observed by nearly every one interviewed, and was seen by many who were 5 or 6 miles away. It was described by some as resembling a gigantic balloon swaying in the wind.

The appearance of the cloud was generally described as of a gray or ashen color with a distinct reddish glow. This apparently more noticeable at distances of 3 to 6 miles.

Very little if any precipitation accompanied the tornado, but there was a heavy downpour of rain immediately after. Coincident with this rain a severe hail storm occurred about 3 to 4 miles north of the path.

The noise attracted the attention of some who were in the track about 10 minutes before its force was felt, while others had not more than a minute's warning. The sound was variously described as, like that of freight trains moving over a trestle, the rumbling of near-by thunder, "a thousand airplanes," etc.

Numerous freak occurrences were related as evidence of the force and character of the storm. In one instance the roof of a brick house was blown off, the walls left intact, and all furniture lifted out and carried away. At another place a coal shed built against the west bank of a deep ravine was carried away. Large pieces of slate from roofs were carried several miles. Pieces of shingle and even straws were found driven into the bark of trees. A piece of tin from a roof was driven about  $1\frac{1}{2}$  inches into the trunk of an oak tree.

Half a mile west of the village of Amity stood a thickly wooded plot of about 10 acres across which the storm passed. Here the path along which the axis of the vortex moved was plainly marked. The zone of destruction is about 200 yards in width. A strip about 50 feet wide in the middle of this zone is a tangled mass of trees and brush. On the north side for about 100 feet all uprooted or broken trees fell toward the south and for an equal distance on the south side they point toward the north, the tops of the nearest ones meeting across the middle line.

After leaving this timber the path crosses the east and west road. On the south side of the road, some 50 yards out in the field stood a large walnut tree which was uprooted and fell nearly due north. A short distance farther east on the opposite side of the road was a five-room house. This house with its brick chimney was lifted bodily from its foundation and carried south across the road a distance of 100 feet. It was then completely demolished and a section of the floor was found half a mile east in a field.

The first place destroyed was that of Mary E. Myers (1 in figure) about 15 miles west and 2 miles north of the center of Dayton. As nearly as can be estimated this distance was covered in about 20 to 25 minutes. After leaving the place of Ira Denlinger (24 in the figure) about 5 miles west of Dayton, the vortex rose above the earth but descended again and did considerable damage in West Dayton shortly before 5 p. m.

The only life lost in the storm was that of Jacob Myers, who was fatally injured while clinging to a post to avoid being carried away by the wind. A few persons were injured but none seriously.

The numbers along the route of the tornado as shown on the accompanying map (fig. 1) indicate the locations

of the homes of the following persons, whose buildings were destroyed or badly damaged:

- |                    |                       |
|--------------------|-----------------------|
| 1. Mary E. Myers.  | 13. Schoolhouse.      |
| 2. Joun Warvel.    | 14. — Bloom.          |
| 3. Jake Myers.     | 15. E. Esterline.     |
| 4. Chas. Wampler.  | 16. A. J. Shafer.     |
| 5. John Steck.     | 17. H. Troutman.      |
| 6. — Stoner.       | 18. Ed. Kimmel.       |
| 7. John Bowser.    | 19. George Filbrum.   |
| 8. Ezra Landis.    | 20. G. Conover.       |
| 9. Jacob Keener.   | 21. J. Roop.          |
| 10. Geo. Milliken. | 22. Philip Derringer. |
| 11. Joseph Harry.  | 23. John Ater.        |
| 12. Ora Keener.    | 24. Ira Denlinger.    |

*Second storm.*—The storm that passed near Johnsville and New Lebanon (II, fig. 1) was less destructive and its path was only about 3 miles long. The funnel-shaped cloud was observed here also, and there is much other evidence of whirling motion.

#### UNUSUAL HAILSTORM AT BALLINGER, TEX.<sup>1</sup>

[From notes of E. M. EUBANK, Cotton Region and River Observer at Ballinger, Tex.]

A terrific thunderstorm, accompanied by heavy rain and hail, occurred in the vicinity of Ballinger from 1 to 2:30 a. m., March 16, 1917. It came from the northwest and after passing a short distance west of the observer appeared to split, one part moving to the south and the other to the southeast. About 3 miles south of Ballinger the rainfall was torrential and the hail terrific, with constant electrical display. The water came off the hills in floods and converted small streams into raging torrents, washing away fences and piling the hail in drifts along fences and in places where debris had found lodgment. One such drift of [water borne] hail covered about 2 acres of ground to a depth of 3 feet. On March 20 the hail was still 1 foot deep in drifts, and the last of the hail did not disappear until March 23, the seventh day after the storm. The total amount of precipitation at Ballinger was 1.10 inches, but the drifts must have been of extraordinary depths to persist so long in face of such temperatures and character of the day as are given in the following table for the period that hail remained on the ground.

Date.	Maximum temperature.	Minimum temperature.	Character of day.
1917.	°F.	°F.	
Mar. 16.....	72	45	Clear.
17.....	77	32	Do.
18.....	72	30	Do.
19.....	78	39	Partly cloudy.
20.....	88	47	Do.
21.....	85	49	Clear.
22.....	89	52	Partly cloudy.
23.....	82	46	Do.

<sup>1</sup> Communicated by B. Bunnemeyer, meteorologist, Houston, Tex.

The storm caused but little damage only because there were no crops in the ground.

#### SEVERE LOCAL STORM AT SAN DIEGO, CAL., FEBRUARY, 1917.

A storm of considerable energy, resembling a small tornado in many ways, visited a limited area in the northern part of San Diego at 8:20 a. m., February 17, 1917. While the storm in itself was not of unusual severity, it is the first storm of similar characteristics having occurred in that section of which there is a record, the vicinity being almost free from destructive winds of any nature. The storm was accompanied by heavy rain and hail and moved from southwest to northeast; its path but a few feet in width and about one-half mile in length, with points of destruction centered at four places separated from each other by 500 to 2,000 feet. The damage consisted in a number of roofs being blown off or wrecked. No one was injured.

#### WINTER OF 1916-17 AT GREENWICH, ENGLAND.

[Reprinted from *Nature*, London, Mar. 22, 1917, 99: 71.]

A good representation of the weather for London is obtained from the Greenwich meteorological observations, and these also show generally the weather conditions over England. The long series of observations affords a trustworthy comparison with past years. Observations for the past winter, December to February, are taken from the results published in the daily weather reports of the Meteorological Office.

The mean temperature for each of the three months was below the average, the greatest deficiency being 4.5°F. in February, and the mean for the whole winter was 3.4 degrees below the normal. The mean winter temperature, 35.9°, was 7 degrees colder than the winter of 1915-16 and was the coldest winter since 1894-95, when the mean was 35.1°, while the lowest in the last 75 years was 34.3° in 1890-91. Frost occurred in the shade on 52 nights during the three months, the occurrences being 18, 19, and 15, respectively [i. e., minima of].

Frost also occurred during the latter half of November, and it is occurring occasionally during the present month. The aggregate rainfall was less than the normal; the total measurement was 4.49 inches, which is 86 per cent of the average fall for the last 60 years. December was the only month with an excess of rain, and in all there were 48 days with rain. The duration of bright sunshine was 63 per cent of the average, and there were 48 sunless days in the three months comprising 90 days in all.